STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

COURSE OUTLINE

ELEC 232 – INDUSTRIAL ELECTRONICS

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY
ENGINEERING SCIENCE & ELECTRICAL
ENGINEERING TECHNOLOGY DEPARTMENT
SPRING 2012

ELEC 232 – INDUSTRIAL ELECTRONICS

A. TITLE : INDUSTRIAL ELECRONICS

B. COURSE NUMBER: ELEC 232

C. CREDIT HOURS: 4

D. WRITING INTENSIVE COURSE: NO

E. COURSE LENGTH: 15

F. SEMESTER(S) OFFERED: SPRING

G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY: 3- Hours Lecture and 3- Hours Lab

H. CATALOG DESCRIPTION: The student is introduced to various electronic components and systems used in modern industry. Operational amplifier principles and applications including comparators (zero and non-zero crossing detectors), voltage followers, inverting and non-inverting amplifiers. Subtraction, summing (mixer), difference and compound amplifiers and active filters. Operational amplifiers circuits are configured to make up complex analog circuits. Examples of these include the temperature controller and the pulse width modulation technique of DC motor speed control. The importance of digital computers used in modern industrial processes is stressed. Thyristors, photosensitive devices, optically coupled devices, and timer control circuits and various transducers are introduced. Three hours lecture, three hours laboratory per week.

I. PRE-REQUISITES/CO- REQUISITES COURSES: Electronic Circuits (ELEC 231) or permission of instructor.

J. GOALS (STUDENT LEARNING OUTCOMES)

By the end of this course, the student will:

1. Learn about the latest electronic devices available in industry
2. Be able to effectively provide detailed explanation to the structure and operation of common linear components.
3. Learn about the digital ICs and sensory electronic devices
4. Use tools/test equipment to analyze electronic components
5. Perform basic electronics troubleshooting

6. Apply critical thinking in solving industrial electronic problems
7. Perform electronics calculation
8. Design basic electronic circuits
9. Learn about industrial control devices
10. Be able to understand the functions of transducer
11. Gain some experience with operational amplifiers

Intuitional Student Learning Objectives (SLO):

(1) Communication (2) Critical Thinking (3) Professional Competence
(4) Inter-Intrapersonal Skills

Course Objectives	*Institutional SLO*
a. Learn about the latest electronic devices available in industry.	2. Crit. Thinking 3. Prof. Competence
b. Be able to effectively provide detailed explanation to the structure and operation of common linear components	2. Crit. Thinking 3. Prof. Competence
c. Learn about the digital ICs and sensory electronic devices	2. Crit. Thinking 3. Prof. Competence
d. Use tools/test equipment to analyze electronic components	2. Crit. Thinking 3. Prof. Competence
e. Perform basic electronics troubleshooting	2. Crit. Thinking 3. Prof. Competence
f. Apply critical thinking in solving industrial electronic problems	2. Crit. Thinking 3. Prof. Competence
g. Perform electronics calculation	2. Crit. Thinking 3. Prof. Competence
h. Design basic electronic circuits	2. Crit. Thinking 3. Prof. Competence
i. Learn about industrial control devices	2. Crit. Thinking 3. Prof. Competence
j. Be able to understand the functions of transducer	2. Crit. Thinking 3. Prof. Competence
k. Will gain some experience with operational amplifiers	2. Crit. Thinking 3. Prof. Competence

K. TEXT: Rehg, James, A., Sartori, Glenn. *Industrial Electronics.* 5th ed. Upper Saddle River: Prentice Hall. 2006

L. REFERENCES: Maloney, Timothy. *Modern Industrial Electronics*, 5th ed. Upper Saddle River: Prentice Hall. 2004

M. EQUIPMENT: Students need to purchase laboratory components kit from the Campus store.

N. GRADING METHOD:

- Quizzes
- Tests
- Midterm Exam
- Lab Projects/Reports
- Homework
- Final Project
- Final Exam

O. MEASUREMENT CRITERIA/METHODS:

- Class Participation
- Laboratory Projects
- Term Paper
- Presentation
- Tests

P. DETAILED LECTURE OUTLINE:

1. Discrete Control Input and Output Devices
    - Introduction to discrete control
    - Mechanical and Electrical Switch Classifications
    - Mutually-Activated Electronic Circuit Switches

- Mechanically-Activated Electronic Circuit Switches
- Discrete Output Devices
- Relays
- Control Diagrams

2. Operational Amplifiers and Linear ICs
   - Introduction to the Op-Amp Parameters
   - Understanding Op-Amp Data Sheets
   - Inverting Amplifiers
   - Non-inverting amplifiers
   - Summing Amplifiers
   - Differential Amplifiers
   - Voltage –to-Current Converters
   - Integrators and Differentiators
   - Comparators and Detectors
   - Active Filter Circuits
   - Instrumentation Amplifiers

3. Thyristors (SCRs, TRIACs)
   - Silicon Controlled Rectifiers
   - Thyristor Triggering Devices
   - SCR Applications
   - Triacs
   - Triac Applications
   - Controlled Thyristor Switches

4. Discrete Automation Sensors and Devices
   - Introduction to Electronic Sensors
   - Non-contact Sensors
   - Sensor Output Interfaces
   - Analog Automation Sensors
   - Sensor Applications and Selection
   - Integrating Sensors into Power and Control Circuits

5. Analog Process Control Devices and Sensors
   - Process Actuators and Output Devices
   - Control Valves
   - Electrical Heating Elements
   - Control Sensors, Transmitters, and Transducers

- Temperature Sensors
- Pressure Sensors
- Flow Sensors
- Level Sensors
- Position Sensors

6. Safety
   - Introduction to Safety
   - Safety Standards
   - Presence Sensors
   - Interlock Devices
   - Developing a Safety Strategy

7. Data Communication Between Intelligent Machines
   - Classification of Network Media
   - Enterprise Networks
   - Fieldbus Networks
   - Factory-Floor Data Network

Q. LABORATORY OUTLINE:

1. System Troubleshooting and Problem Solving
2. Input and Output Devices Testing/Troubleshooting
3. BJT Circuits Troubleshooting and Testing
4. Operational Amplifier Circuits Testing/Troubleshooting
5. Discrete Sensor Applications and Testing
6. Troubleshooting Process Control Devices and Sensors
7. Troubleshooting and Testing Network Devices